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July 26, 1999

U.S. Environmental Protection Agency
Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

ATTENTION : Mr. Dan Wall

40332189



Superfund

**SUBJECT : Responses to EPA Comments
Draft Remedial Investigation Report and
Draft Baseline Risk Assessment
West Lake Landfill Operable Unit 1, Bridgeton, Missouri**

Dear Mr. Wall,

On behalf of Cotter Corporation (N.S.L.), Laidlaw Waste Systems (Bridgeton), Inc., Rock Road Industries, Inc., and the United States Department of Energy (the "Respondents"), Engineering Management Support Inc. (EMSI) submits the attached responses to EPA comments on the draft Remedial Investigation Report submitted on March 9, 1998 and the draft Baseline Risk Assessment submitted on April 22, 1998. EPA's comments were presented in your letter dated June 4, 1999 that we received on June 10, 1999. Please call me once you have had an opportunity to perform an initial review of the response so that we may discuss them. If you have any questions or desire additional information related to the responses to EPA comments or any other aspect of the project, please do not hesitate to contact me.

Sincerely,
ENGINEERING MANAGEMENT SUPPORT, Inc.


Paul V. Rosasco, P.E.

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**Responses to EPA Comments
Draft Remedial Investigation Report
West Lake Landfill Operable Unit 1**

General Comments

Use of “Reference Levels”

Comment: We [EPA] understand the rationale provided for the use of “reference levels”, and we understand the desire to provide a screening level indication of site impacts. However, we have some concern that the RI makes judgements regarding the nature and extent of contamination based on comparisons with reference levels and drinking water standards. Comparisons with health-based levels and standards can be useful in indicating magnitude or significance but not generally in indicating the existence of site impacts. The appropriate use of conservative health-based screening levels is to compare with site concentrations in order to make a threshold judgement as to whether more sophisticated risk assessment should be undertaken, but not to determine whether contamination is present. Background generally serves as the ideal reference point for determining whether contamination is present. The presence of contamination can be significant to the site model and an understanding of contaminant migration regardless of whether it has significance from a health standpoint.

Response: EPA indicates in its first general comment that comparison of site data to “reference levels” (based on the standards for uranium and thorium mill tailings promulgated by EPA in 40 CFR 192) and drinking water standards may be useful in indicating the magnitude or significance of site related impacts. However, EPA further indicates that such comparison may not be appropriate for determination of whether contamination is present or the extent of such contamination. EPA further states that comparison to background is a better method for determining whether contamination is present.

We agree with EPA’s assessment that strictly speaking contamination is the occurrence of site-related constituents at levels greater than background. We further agree that comparison of site values to “reference levels” is a useful means of identifying the magnitude or degree of significance of the site impacts or for identifying areas of greater impact, it does not completely define the extent of contamination or site impact.

EPA’s RI/FS Guidance for Municipal Solid Waste Landfills indicates that the primary focus of the RI/FS effort at municipal solid waste landfills should not be focused on large volumes of low levels of contamination but should focus on identifying smaller areas with higher levels of contamination. Consequently, for purposes of Operable Unit (OU) –1, we chose to use reference levels as a means of describing the extent of higher levels of radionuclide occurrences. In order to insure that the reference levels used in the draft

RI were not mistaken as a basis for defining contamination, we included an extensive discussion or “disclaimer” regarding the use and significance of “reference levels” in the RI report.

Based on EPA’s comments and subsequent discussions, we propose the following actions to address this comment:

1. We will review the language associated with the discussion of the use of “reference levels” to check that it adequately clarifies the distinction between reference levels and contamination;
2. We will augment the existing discussions in Section 6 - Nature and Extent of Radiologically Impacted Materials of the draft RI to include discussion of the extent of radionuclide occurrences above the site-specific background levels (as presented on Table 6-5 of the draft RI report) but below the reference levels. Specifically, we will examine the site data to ascertain to the extent possible whether any discernable patterns exist in the occurrences of radionuclides at levels below the reference values but above background; and
3. We will revise Section 7 – Contaminant Extent, Fate, and Transport to focus on comparison to background levels where available and use reference levels or drinking water standards as a means of providing a context for the potential significance of occurrences of the various site-related constituents.

We believe it is still important for the RI/FS to focus on those areas within the landfill with higher levels of contaminants in accordance with EPA’s RI/FS guidance. We understand that EPA is not requesting elimination of the use of reference levels in Section 6.0 of the draft RI. Based on our discussions, we understand that EPA desires an acknowledgement that the reference levels do not define the total extent of contamination along with additional discussion of occurrences of site-related chemicals at levels below reference levels but above background levels as part of Section 6. As stated in the third item above, Section 7 of the RI will be revised as necessary to focus on identification of the extent of contamination using a comparison to available background data. Reference levels, drinking water standards, or other health-based levels will be used in Section 7 as a means of describing the potential significance of the occurrences of site-related contaminants in the various environmental media.

Impacts of Uranium on Groundwater

Comment: We [EPA] also have some concern that the potential impacts to groundwater from uranium have not been evaluated. Depending on the alkalinity, significant levels of uranium can be leached from relatively low concentrations in soil. Also, as landfill conditions become more aerobic with time, uranium can become more mobile.

Response: EPA has indicated that depending upon alkalinity, significant levels of uranium can be leached from relatively low concentrations in soil and also as the landfill conditions become more aerobic, uranium can become more mobile.

There are a number of potential factors associated with potential dissolved phase transport of uranium. These include eH and pH conditions of the water, the presence of inorganic complexing agents as well as organic complexing agents, and soil and waste conditions including cation-exchange capacity and fraction of organic carbon present. Considering the generally low levels of uranium found in the landfill materials along with the fact that the waste materials were disposed in Areas 1 and 2 a minimum of 25 years ago, any potential changes that may occur in the future are likely to be very small and to occur gradually over time.

In response to EPA's comment, the section on fate and transport will be revised to include estimates of the leaching potential of uranium over time, and resultant effects, if any, on the groundwater beneath and downgradient of the site. To the extent possible, these evaluations will include quantitative estimates of the potential leaching of uranium over time. If this is not possible, a qualitative assessment will be included in the RI. To the extent that the assessment indicates that the future concentrations of uranium in downgradient groundwater could exceed possible health-based criteria, this pathway will be addressed either quantitatively or qualitatively in the BRA.

General Comments on the BRA

Comment: EPA Region 7 has a cooperative agreement with the Missouri Department of Health (MDOH) enabling MDOH to support the region in the review of superfund site risk assessments. MDOH has been engaged to serve this function on the Westlake Landfill site and will serve as the primary reviewer. It is our understanding that MDOH has provided comments to you on this document and that informal resolution of the comments was reached through direct discussion with Pam Holley. We will not reiterate those comments here; however, we are prepared to discuss those to the extent questions remain. We identified the following additional issues in our review of the document:

1. The risk calculations presented in the draft document do not indicate that response action is necessary based on comparison to the acceptable risk range provided for in the NCP. However, all appropriate hypothetical exposure pathways are not evaluated. See the second item below.
2. While it is appropriate to design future hypothetical receptor scenarios based on reasonably anticipated land-use, it is not appropriate to preclude evaluation of pathways based on the existence of deed restrictions, restrictive covenants, or other institutional controls. These existing institutional controls, in effect, are remedies,

and the pathways they are intended to preclude should be evaluated in order to properly incorporate such restrictions into the remedial strategy as appropriate.

3. Although our guidance in this area is still in a state of development, we currently recommend that the radon pathway be excluded from calculations of excess lifetime cancer risk and that the radon pathway be evaluated independently. As we proceed with the decision process we will need to remain cognizant of how this might affect the development of risk-based goals.

Response: EPA has indicated that the Missouri Department of Health (MDOH) has provided comments on the Baseline Risk Assessment (BRA) and that informal resolution of the comments was reached through direct discussion with Pam Holley. EPA presented these comments as part of its draft comments on the RI report.

On September 24, 1998, representatives of EMSI, Auxier and Associates (authors of the BRA) and Herst and Associates (consultants for OU-2) met with Steve Kinser (EPA), Pam Holley (MDOH), and Jalal El-Jayyousi (Missouri Department of Natural Resources [MDNR]) to discuss the comments on the RI and BRA. At that meeting, EPA provide direction regarding which of the comments were appropriate for consideration in the BRA, and a general discussion was held regarding the approach to be used to incorporate these comments into the revised BRA. A summary of these discussions and proposed actions as a result of the specific comments identified by EPA are presented at the end of this document.

EPA in its comments dated June 4, 1999 has also provided two additional general comments regarding the BRA. First, EPA has indicated that it is inappropriate to preclude evaluations of potential hypothetical future receptor scenarios based on the existence of deed restrictions, restrictive covenants or other institutional controls. The BRA will be revised to include a hypothetical scenario involving a commercial/industrial worker working in a building located adjacent to Areas 1 and 2 but also capable of conducting ancillary activities such as outdoor storage or parking lots within Areas 1 and 2. The text will include an acknowledgement that deed restrictions exist that prohibit certain activities from occurring in Areas 1 and 2.

EPA, in its second general comment on the BRA, has indicated that the radon pathway be excluded from calculations of excess lifetime cancer risk and that it be evaluated independently. We agree with the comment and will separate the calculations of excess lifetime cancer risk due to radon from those arising from the presence of other radionuclides.

Specific Comments on the RI Report

Section 3 – Site Background

Comment: This section provides very little information on the origin, composition, volume, or placement of the wastes that were received. Presumably this type of information provided one of the bases for the approach to remedial investigation. We understand that there is not a great amount of specific information available, but what is known should be briefly described.

Response: We do not believe that such information is necessary for completion of the RI. The technical data developed for the RI will provide the basis for the feasibility study and remedy selection.

Comment: Section 3.3 –A comparison of figures 3-6 and 6-7 appears to indicate that not all of the contaminated soil on the Ford property is included in the buffer zone.

Response: The comment is correct. Low levels of radionuclides have been detected in surface soil located to the west of the existing buffer zone on property previously owned by Ford and now owned by Merus Properties (Merus). The Respondents have been involved in discussions with Merus regarding expansion of the buffer zone to include more of the contaminated area. Such reconfiguration would provide additional space to allow for re-configuration of the landfill slope adjacent to the buffer area. These discussions necessarily involve the need to consider the status of the areas outside of the expanded buffer zone at the earliest practicable time.

Section 4 Site Investigation activities

Comment: Section 4.3, Over land Gamma Survey –The overland gamma survey can be a good tool for identifying “hot spots” or areas needing further investigation, but does not necessarily do a good job of delineating the areal extent of radiologically impacted areas, e.g, surface concentrations of Th230 in excess of 2000 pCi/g could go undetected. Page 18 -Based on our experience, we would expect background values to be closer to 10 uR/hr.

Response: We agree that the overland gamma survey does not completely delineate the areal extent of radiologically impacted areas. Areas of elevated radionuclides (albeit based in part on the use of reference levels) were determined using a combination of overland gamma survey results, surface and subsurface soil sample analytical results and the results of the downhole gamma logs. These three types of information were reviewed in conjunction with each other to define the potential extent of elevated levels of

radionuclides. Areas containing elevated radiological occurrences that were identified based on soil sample analyses were not eliminated from the extent of contamination based on the low results from the overland gamma survey. The approach that was used was to identify the "union" of the areas potentially containing elevated levels of radionuclides that were identified by any of the three data collection methods (overland gamma survey, soil sample analyses or downhole gamma logging). The resultant combined area was presented as the potential extent of elevated levels of radionuclides. The discussion presented in the draft RI report will be expanded to further describe the procedure used to identify the estimated extent of elevated levels of radionuclides.

With regard to the expected background levels of overland gamma readings, the background levels presented in the RI report are based on site-specific readings obtained from eight unimpacted areas in the vicinity of the landfill. These results are based on nearly 3,000 measurements of background gamma levels. The mean values obtained from each of the eight locations ranges from a low of 8.77 uR/hr for the limestone quarry fines to a high of 16.31 uR/hr for the borrow pit shale (referred to as the Ladonda Shale by McLaren/Hart). These data along with the results of the entire overland gamma survey were presented in McLaren/Hart's 1996 Overland Gamma Survey Report. It is unclear which sites EPA is referring to in forming its expectation that background levels for the overland gamma survey should be closer to 10 uR/hr. Without performing extensive evaluation of the data from these sites, we are unable to provide an explanation for any differences that may exist between the background gamma readings obtained from the various studies of other locations. Such variations could be the result of the different instruments being used, instrument calibration differences, different geologic conditions, other factors or a combination of these. Consequently, no modifications are proposed for inclusion in the revised RI report.

Comment: Page 20, last bullet of Section 4.4.1 –The last sentence is probably intended to read “....occurrences did *not* extend below...”

Response: The comment is correct and the sentence will be revised to state that “...*the vertical extent of radionuclide occurrences did not extend below a depth of approximately six inches.*”

Comment: Page 23, second bullet –Further clarification on this point is needed. The Ladonda Shale does not exist in the Stratigraphic Succession in Missouri. There is a Lagonda Formation in the upper portion of the Desmoinesian Series which contains shale but it lies significantly higher in the stratigraphic succession than the Cheltenham Formation. Since McLaren/Hart cited naturally occurring radiation in the ‘Ladonda Shale’ as a basis for some of the assumptions made, a clearer discussion on the actual identification and radiological characteristics of the material should be provided.

Response: McLaren/Hart collected a sample of shale materials exposed in the area of the former borrow pit at a time when the borrow pit was actively being excavated. McLaren/Hart described this shale as being part of the Ladonda Shale. We realize that this description is inaccurate; however, it is referenced as such in various site data and investigation reports prepared by McLaren/Hart to document the results of the RI field investigations and laboratory analyses. Consequently, even though the sample was not obtained from the Ladonda Shale but rather from the Cheltenham Formation, we believe it should be referred to as being classified as Ladonda Shale by McLaren/Hart to provide a basis for reference to and consistency with the site data reports. Regardless of what formation the sample was attributed to by McLaren/Hart, the sample was obtained from shale obtained from the site borrow pit for use as daily, intermediate and final cover materials. Therefore, the analytical results obtained from this sample are important information for assessing the levels of naturally occurring metals and radionuclides that have become incorporated into the landfill as part of landfill construction and operation. The bulleted item referred to in EPA's comment will be revised to better explain the reference to the Ladonda Shale.

Comment: Page 31, first bullet –The indicated range of background values is higher than we have seen at other sites in Missouri.

Response: The basis for the comment is unclear. The results of the radionuclide analyses of the four background samples obtained during the RI investigations are summarized on Table 6-5 of the draft RI report and are compared to background results obtained from other investigations in Table 6-6 of the draft RI report. Review of the radionuclide results presented on Table 6-6 indicates that the site mean background levels are the same as those obtained from the Bechtel National, Inc. investigation performed for the State of Missouri and the UNC Geotech and Project Management Contractor investigations of the Weldon Springs area. Consequently, no modifications are proposed for inclusion in the revised RI report.

Comment: Page 31, second bullet –Please clarify this point. There is an apparent contradiction in that WL-105 is described as having a 10.5-foot thickness of material exhibiting elevated gamma readings, and is also described as a location having no elevated gamma readings of any kind. Here, and in the subsequent bullet, it is mentioned that overland gamma readings by RMC and McLaren/Hart did not yield comparable results, yet no explanation or potential explanations are found.

Response: We agree that there is a contradiction regarding the statements made relative to boring WL-105. The last sentence of this bullet actually should refer to boring WL-108 not boring WL-105. We apologize for this typographical error.

With regard to the two differences noted between the results of the RMC and the McLaren/Hart overland gamma surveys, no explanation for these differences can be confirmed. These differences were first identified and discussed by McLaren/Hart in the Soil Boring/Surface Sample Investigation Report prepared and submitted in 1996; however, no explanation as to why these differences occurred was presented in the McLaren/Hart reports. In the first case (Boring WL-108 as discussed in the second bullet), the RMC investigation indicated the presence of high overland gamma readings that were not confirmed by the overland gamma survey, downhole gamma log or soil sample analytical results obtained by McLaren/Hart. In the second instance (Boring WL-234 as discussed in the third bullet on this page), McLaren/Hart did not detect high overland gamma readings in an area where they later found elevated downhole gamma readings and where the previous overland gamma survey conducted by RMC identified high overland gamma readings. Such differences could be the result of the different instruments used, instrument calibration differences, minor variations between the locations of the readings, other factors or a combination of these. Consequently, no modifications are proposed for inclusion in the revised RI report.

Comment: Page 38, second paragraph –The rationale provided in this paragraph should be reconciled with reported damage to these weirs during the May 1995 storm event.

Response: We agree with the comment and the text will be modified to add a discussion of the effects of the estimated 100-year storm on runoff conditions. Specifically, the text will be modified to describe how the runoff control berms constructed at the top of the landfill slope are effective in diverting water away from the slope as evidenced by the difficulty that McLaren/Hart had in obtaining runoff samples from weirs 5, 6 and 7. This discussion will be augmented to indicate that although the berms are effective in diverting runoff during typical storm events, they apparently were not effective in diverting runoff during extreme storm events as evidenced by the washout of the weirs in this area during the May 1995 storm event. Overall the RI will conclude that little erosional scour and sediment transport occurs on the landfill slope during typical storm events but that occasional erosion and sediment transport may occur during extreme storm events.

Comment: Page 40, first full paragraph –Th230 is not a strong gamma emitter, and absent other radionuclides, might not be measurable with these techniques. We would not discount the results of laboratory analysis on this basis.

Response: As stated in the text, we have not discounted the results of any of the thorium-230 analyses. However, there is a lack of consistency of some of the thorium-230 results with other indications of radionuclide occurrences (elevated overland gamma readings, elevated downhole gamma readings, and occurrence of other radionuclides at elevated levels). Coupling this observation with the difficulties encountered by the laboratory in

performing low level thorium analyses, we felt it prudent to caution readers against over-analyzing or over-interpreting the thorium-230 data. Consequently, no modifications are proposed for inclusion in the revised RI report.

Comment: Section 4.5 –We suggest that a monitoring well summary table providing easy access to information such as ground elevation, construction parameters, open intervals, and monitored zone would be a very helpful reference.

Response: We agree that a table summarizing the monitoring well construction and survey information would be helpful and will include such a table in the revised draft of the RI report.

Comment: Section 4.5.4, Summary of Results –Reference the location of groundwater data summaries.

Response: The groundwater results are presented in Appendix C. A reference to Appendix C will be included in this section.

Comment: Section 4.6.4, page 52, last paragraph –The use of “reference levels” to indicate whether or not contaminated sediments are migrating through surface water pathways is probably not appropriate.

Response: As discussed in our response to EPA’s first general comment, we agree that the use of reference levels may not be appropriate as the basis for assessing migration, fate and transport from the source areas. The text of Section 7 will be modified to focus on a comparison to background levels, where available, and will only refer to reference levels as a means of assessing the magnitude or significance of the various radionuclide occurrences.

Comment: Section 4.7.4, page 57 –Figures 4-15 and 4-16 present the sample locations but not the results of the methane gas survey as stated. It is unclear why these data are not considered relevant to site characterization. Methane generation could be a significant feasibility study and design consideration for certain remedial alternatives.

Response: The results of the methane gas sampling were presented in the Soil Boring/Surface Soil Investigation Report prepared in November 1996 by McLaren/Hart. Methane is not a CERCLA hazardous substance and is not an OU-1 constituent of concern. The presence of high levels of methane gas is considered to be a given in a solid waste landfill environment. Actual and potential changes in the landfill operations over time (i.e., changes in the system layout and operation of the landfill gas collection

system) could result in changes in the potential distribution and concentration of methane in the subsurface. Consequently, it would be prudent for health and safety purposes to collect additional methane gas data as part of any remedial design and remedial action activities and not rely on the results of the 1995 measurements. For these reasons, the 1995 methane gas results were not presented in the RI. However, a general summary of the levels of methane gas encountered along with a reference to the 1996 report that contains these results will be added to this section of the RI report.

Section 5 Physical Characteristics of the Study Area

Comment: The inclusion of geologic cross sections depicting the contact between the fill material and the underlying alluvium and the relationship to bedrock would be very helpful in conveying the conceptual model of the site.

Response: Geologic cross-sections depicting the requested information were presented in the 1996 Soil Boring/Surface Soil Investigation Report prepared by McLaren/Hart. Selected cross-sections from this report will be included in the revised draft of the RI report along with a reference to the earlier McLaren/Hart report.

Comment: Section 5.6.2.4, page 78 –What method was used for the evaluation of slug test data? Reference the report containing the data and analysis. Table 5-3 should include the well number from which the values were calculated and explain the significance of the grouping.

Response: The methods used to analyze the slug test results along with a reference to the 1996 McLaren/Hart Groundwater Conditions Report that presents the results and the analyses of these results were previously described in Section 4.5.2.4 (page 43) of the draft RI report. A reference to this earlier section and the previously submitted McLaren/Hart report will be added to Section 5.6.2.4 (page 78) for clarity.

Section 6 Nature and Extent of Radiologically Impacted Materials

Comment: Discussions on the nature of the radiologically impacted areas should include some interpretation of the extent to which the principal radionuclides appear to be co-located. This will have a bearing on interpretation of the gamma surveys. Note that the composition of the waste materials in the source areas may differ from materials deposited through erosional processes such as the soils on the Ford property.

Response: We agree with the comment and will expand the discussions in Section 6 to include assessments of the extent to which the principal radionuclides appear to be co-located.

Comment: Section 6.2, page 85 –While the isotopic concentrations presented in Table 6.6 appear consistent with other sites in the area, the gamma exposure rates appear to be significantly higher. To the extent gamma exposure rates are used to define the remedy, some further verification of these numbers might be indicated.

Response: We are unclear as to what EPA intended in its statement “... *some further verification of these numbers might be indicated.*” We do not believe that additional data regarding gamma emissions are necessary to assess the potential risk associated with OU-1 or to select a remedy for OU-1. We agree that to the extent that the overland gamma readings are potentially biased high, some additional data collection may be necessary during the remedial design phase to more precisely define the extent of the areas containing elevated levels of radionuclides. However, the need for and scope of any remedial design data collection activities will be a function of the nature of the specific remedy selected by EPA.

Comment: Section 6.3, page 85 –Reference levels - see general comment above.

Response: Please see the response to EPA’s first general comment presented above relative to the use of reference levels.

Comment: Section 6.5.1, fifth paragraph, last sentence –Should this read “deeper” than 3 feet rather than “shallower”?

Response: The statement is unclear and will be deleted as it is actually referring to the results of downhole logs from other borings in the area.

Comment: Section 6.5.2, page 92 –Again, we would not discount analytical results showing elevated levels of Th230 based upon a lack of elevated gamma measurements.

Response: As stated in this section and page of the draft RI, none of the thorium results were discounted based on the lack of elevated gamma readings. Please also see the response presented above to EPA’s comment on the first full paragraph on Page 40 of the draft RI. Consequently, no modifications are proposed for inclusion in the revised RI report.

Comment: Section 6.6, first paragraph, last sentence –Should this read “deeper” than 3 feet instead of “shallower”?

Response: The statement is unclear and needs to be deleted as it is actually referring to the results of downhole logs from other borings in the area. The text of the RI will be revised appropriately.

Section 7 Contaminant Extent, Fate and Transport

Comment: Section 7.1.1.1.1, page 98 –The radon flux measurement locations are on Figure 4-14, rather than 4-13.

Response: Section 7.1.1.1.1, Page 98 – We agree with the comment. The radon flux locations are shown on Figure 4-14 not Figure 4-13 as stated. The RI will be revised to refer to the correct figure.

Comment: Section 7.1.1.2, Fugitive Dust –The conclusions in this section appear to be more strongly stated than is warranted. Based upon the description provided, we would tend to disagree that a worst-case scenario was evaluated. Based upon the results of this single limited sampling event, one might reasonably conclude that atmospheric transport of fugitive dust does not appear to be a significant pathway for offsite migration under moderately windy conditions given that the site is undisturbed and vegetation remains intact.

Response: We agree in general with the comment and the text will be modified. Specifically, the conclusion at the end of this section will be modified to read *"Therefore, EMSI concludes that atmospheric transport of radionuclides in fugitive dust does not appear to be a significant pathway for offsite migration under moderately windy conditions given that the site is undisturbed and vegetation remains intact."* The reference to worst-case scenario was to the degree of wind on the day the sampling was performed and the lack of moisture prior to the sampling activities, conditions that are both favorable to transport of windblown dust. The reference to worst-case scenario will be deleted from the RI text.

Comment: Section 7.1.2.1, Rainwater Runoff Transport –Reference to Figure 4-1 should be included.

Section 7.1.2.1, Rainwater Runoff Transport – We agree with the comment. A reference to Figure 4-1 will be added to the text of this section of the RI.

Comment: Section 7.1.4.2, page 114, last paragraph –This attempts to justify the conclusion that groundwater transport is not a significant pathway for contaminant

migration based on limited potential for exposure to groundwater. The potential for contaminant migration is independent of the potential for exposure.

Response: We agree with the comment and will clarify those points that relate to potential groundwater migration from those points that relate to potential groundwater exposure.

Comment: Section 7.2.3.1, Leaching and Sorption –Generally speaking, uranium has a much smaller retardation factor than does radium and will have the greatest potential impacts to groundwater. Even though uranium occurs at much lesser concentrations within the source materials, we believe it would be appropriate to present this calculation as well. Also, assuming we are trying to place an upper bound on potential impacts, we are not convinced that an arithmetic average value from all samples taken provides the appropriate input concentration.

Response: We agree that uranium will generally be less retarded than radium and has more potential to migrate in groundwater. We will add this calculation to the text of this section. With regard to the value used as input to the calculations, given the typically lognormal distribution of environmental data, the geometric mean is probably the best predictor of the overall population. Use of the arithmetic mean of the soil values does tend to over-estimate the predicted average groundwater concentration. The text will be revised to include a calculation based on the geometric mean. We also considered using an upper 95% confidence interval as a predictor of worst case leaching; however, such an estimate would be based on values that statistically would only be expected to occur in a very small portion of Areas 1 and 2. Given the subsequent dispersion and dilution that would occur in the groundwater system, use of a 95% upper confidence interval would greatly over-estimate the concentrations that would be expected to occur in the groundwater system.

Section 8 Non-Radiological Chemical Occurrences in Areas 1 & 2

Comment: Summary tables showing locations, detected concentration ranges and frequencies, and corresponding background concentrations would be a more usable way to present this information.

Response: We agree with the comment and will include summary tables showing the locations, detected concentration ranges and frequencies of detection along with the background concentrations in the revised draft of the RI.

Comment: Section 8.6, Constituents Detected in Groundwater –It is difficult to sort out any patterns of contamination or judge the density of data with the presented information.

We could not find an explanation of the monitoring well identification system. It is generally useful to map the areal extent of certain constituents with depth.

Response: We agree that it is difficult to sort out any patterns of occurrences of non-radiological contaminants primarily because such patterns do not appear to exist. The field investigations associated with OU-1 were primarily designed to obtain information regarding the nature and extent of radionuclide occurrences and only secondarily to obtain data regarding occurrences of non-radiological constituents. We have re-reviewed the results of the non-radiological analyses and conclude that no discernable patterns in the occurrences of non-radionuclide constituents exist either areally or vertically. The lack of a discernable pattern in constituent occurrences is consistent with our experience at other solid waste landfill sites. The RI report will be modified to discuss the lack of any discernable patterns in the occurrences of non-radionuclide constituents in groundwater.

An explanation of the monitoring well identification system will be included as part of the monitoring well construction table discussed in the response to the comment regarding Section 4.5 and will be cross-referenced in this section of the RI report.

**Responses to EPA Comments
Draft Baseline Risk Assessment
West Lake Landfill Operable Unit 1**

Comment: "The use of Region 3 screening values is not recommended due to errors in the values. EPA has requested that the Region 3 tables not be used in risk assessments."

Discussion: After discussing this comment at our September 24, 1998 meeting, EPA and MDOH agreed that the Respondents could address this comment by replacing the Region 3 screening values with the Region 9 screening values.

Action: The evaluation of non-radiological parameters will be based on the Region 9 values and the text of the Baseline Risk Assessment (BRA) will be amended as necessary.

Comment: "In Section A.3.1.8.2, future land use is discussed. It is assumed that due to the deed restrictions that future exposure at the site will be the same as current exposure. This may not be the case. Although some development may be restricted, occupational activities and exposures may change. Currently, according to the text, there is little access to the site for workers. However, worker exposure could increase in the future if the site is remediated to "safe" occupational levels, levels based on minimal current occupational exposure. Construction and building installation in the area immediately surrounding Areas 1 and 2 is not restricted. These adjacent areas could be occupationally developed in the future and Areas 1 and 2 could be included in this usage without buildings being built, for example as equipment storage areas or as recreational grounds for employees. There is no method to restrict the type and magnitude of occupational exposure, therefore, any assessment of future risk should include a reasonable maximum exposure to occupational workers."

Discussion: At the September 24, 1998 meeting, it was agreed that the comment could be addressed by revising the BRA to include a scenario addressing commercial/industrial buildings and land uses outside of Areas 1 and 2 with ancillary uses such as parking lots or outdoor storage inside of Areas 1 and 2. Several other clarifications related to future land use were discussed at the September 24, 1998 meeting. These included placing a copy of the existing deed restrictions in the RI report and referencing the existence of the fence around the landfill property. Also tables summarizing the results of the chemical of concern screening should be placed in an appendix to the BRA.

- Action:** The revised BRA will include evaluation of potential risks associated with ancillary commercial uses of Areas 1 and 2 in the future. Additional discussion will be developed and included in the BRA text regarding the potential trespasser scenario relative to the risks associated with the groundskeeper scenario. The text of the RI/BRA will be modified to describe the existing fence and to include a reference to the existing deed restrictions. A copy of the existing deed restrictions will be placed in an appendix to the RI. A table summarizing the results of the chemical of concern screening will be added to the BRA.
- Comment:** "The exposure frequency presented in Section A.3.2.5 of one day per year for a groundskeeper is too low. Please indicate any documentation that all grounds are currently mowed once per year. The future exposure frequency can be realistically expected to be greater than one day per year due to possible future activities such as adjacent industrial or on-site storage, etc."
- Discussion:** At the September 24, 1999 meeting the participants concurred that the groundskeeper scenario should be modified to reflect the actual activity as "brush-hogging" rather than mowing. In addition, it was agreed that this comment could be addressed by revising this scenario to include brush-hogging activities three-days per year rather than one. The use of three days per year is based on the current frequency that vegetation is cut on the landfill surface outside of Areas 1 and 2. Potential future uses of Areas 1 and 2 ancillary to commercial/industrial activity in adjacent areas would be addressed as part of the revised BRA.
- Action:** The text associated with the groundskeeper scenario will be revised to reflect brush-hogging three days per year rather than lawn mowing one day per year. Additional discussion will be provided to support the three-days per year exposure frequency.
- Comment:** "The default value of 0.001 used for dermal absorption is referenced to EPA (1995). The revised 1997 dermal guidance from EPA recommends a value of 0.01 be used for a default for inorganics."
- Discussion:** The comment refers to the following sentence found on page A.3-24: "In the absence of empirical data, the EPA (1995a) recommends a reasonable default value of 0.001 for organic chemicals." This sentence is intended to support a general discussion on the approach used to assess dermal absorption. This value was not used to evaluate dermal absorption in the Draft Risk Assessment. The sentence is misleading in its present context. Empirical data does exist for some of the chemicals of concern considered by this risk assessment and was used to calculate chemical-specific dermal

absorption in the Draft Risk Assessment. The value of 0.01 cited in the comment was used for chromium, lead, and uranium. These values are listed in footnote "1" of Table A.3-9.

Action: We will delete the following sentence on the bottom of page A.3-24 "In the absence of empirical data, the EPA (1995a) recommends a reasonable default value of 0.001 for organic chemicals."

Comment: "The default exposure duration for the groundskeeper scenario should be 25 years, not 6.6 years."

Discussion: As discussed at the September 24, 1999 meeting, the 6.6 year exposure time is consistent with EPA's recent guidance on activity factors for occupational mobility. The citation for this guidance is presented in footnote "d" of Table A.3-9 in the April, 1998 Draft Risk Assessment. Footnote "d" cites page 15-17 of the August 1997 Exposure Factors Handbook. In this publication, EPA states "When age cannot be determined, it is recommended to use the median tenure value of 6.6 years for working men and women 16 years and older."

Action: No modifications are proposed for inclusion in the revised BRA report.

Comment: "The exposure frequency for the groundskeeper at all areas should be 26 days per year."

Discussion: As discussed at the September 24, 1998 meeting, the different exposure frequencies used in the April 1998 Draft Risk Assessment were selected after consulting with the site operators. Based on preliminary discussions with the landfill operator, we assumed that onsite brush-hogging activities occur only once per year in areas of the landfill outside of Areas 1 and 2. Subsequent investigations as a result of this comment have indicated that the actual practice involved brush-hogging with a large riding tractor three times per year. Based on the actual frequency of brush-hogging activities on other portions of the landfill, it seems reasonable to assume that the Areas 1 and 2 would also be brush-hogged three times a year to control new growth and provide a more uniform appearance.

It was assumed that offsite lawn-mowing activities on the former Ford property would occur weekly for a period of twenty-six weeks of every year. These values are thought to best represent site specific practices. Therefore, no changes are necessary to the frequency of offsite lawn-mowing activities used in the draft BRA.

Action: Change the value of EF for the Landfill Grounds Keeper from 1 d/y to 3 d/y. No change is required for the offsite groundskeeper scenario.

Comment: "The exposure time for the groundskeeper at all areas should be 8 hours per day."

Discussion: An 8 hours per day exposure time was used for scenario of a groundskeeper in Areas 1 and 2 in the draft BRA. A value of 2 hours per day was used for the Ford Property Grounds Keeper based on the assumption that a commercial grounds keeping company would perform lawn maintenance for any businesses located on the Ford Property. A crew of individuals using powered equipment would be expected to spend about 2 hours each week mowing grass, trimming edges, and tending plants. This is a site specific estimate, based on the size of the Ford Property, the areal extent of grass and planted areas expected to remain after commercial development, and the speed of powered equipment.

Action: No modifications are proposed for inclusion in the revised BRA report.

Comment: "The standard ingestion rate for a groundskeeper is 0.48 grams per day, not 0.1 grams per day as stated."

Discussion: As discussed at the September 24, 1999 meeting, the 0.1 g/d soil ingestion rate is consistent with EPA's recent guidance on soil ingestion and pica among adults. The citation for this guidance is presented in footnote "i" of Table A.3-9 in the April, 1998 Draft Risk Assessment. The previous guidance on this subject, found in OSWER Directive 9285.6-03, Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors" (1991) recommended an occupational intake of 50 mg/d (pgs 9-10 and Table 1). It also contains a provision to use 480 mg/d for occupations involving earthmoving such as construction or landscaping (Appendix B). The likely receptor on this site will not be routinely moving dirt because such activities are prohibited by legal restrictions on property use.

It was judged that the 50 mg/d stipulated by OSWER Directive 9285.6-03 might not be sufficiently conservative. This judgement was made because resuspended dirt may settle on a groundskeeper's skin, increasing the potential to ingest additional amounts of soil. Once the determination was made that the standard default parameter may not be sufficiently conservative for this specific site, information on soil ingestion and pica among adults presented on page 4-21 of the August 1997 Exposure Factors

Handbook was used to select a more health protective value for this parameter.

On page 4-21 of the August 1997 Exposure Factors Handbook, EPA discusses three soil ingestion studies. After evaluating the information available, EPA opines that the results of the tracer study published by Calabrese et al in 1990 are “probably the most reliable of the three...” The EPA summary states this study “...found a range of 30 to 100 mg/day...” for adults. The ingestion rate of 100 mg/d chosen for the Draft Risk Assessment is the maximum adult ingestion rate reported by the 1990 Calabrese et al. study.

Action: No modifications are proposed for inclusion in the revised BRA report.

Comment: “The fraction of ingestion should be 100% for the groundskeeper. The groundskeeper is assumed by EPA to receive the bulk of the 480 mg of soil (EPA default) ingested to be at work during his job as groundskeeper”

Discussion: The 100% value cited in the comment is based on 8 hours per day of occupational exposure at a site. However, as previously discussed, the amount of time spent by the Grounds Keeper on the Ford Property is expected to be 2 hours per event. The amount of time assumed to be spent on Operable Unit 1 is 8 hours per day. For this reason, it was agreed that the comment could be addressed by changing the fraction ingested for the Ford Property Grounds Keeper from 0.125 to 0.25, and the fraction ingestion for the Landfill Grounds Keeper from 0.5 to 1.0.

Action: The FI entries in Table A.3-9 will be changed to conform with the discussion summarized above. Footnote “j” in Table A.3-9 will be changed to “ $FI = ET / 8 \text{ hour working day.}$ ” The text of Section A.3.4.2.6 on page A.3-26 will be deleted and the following text substituted: “The fraction of ingestion used in this report is calculated as the amount of time spent at the site divided by the amount of time spent working as a groundskeeper during the day. The landfill groundskeeper is assumed to spend 8 hours out of a possible 8 working hours at the West Lake Landfill, yielding an FI of 1.0. The Ford Property groundskeeper is assumed to spend 2 hours out of a possible 8 working hours on the Ford Property, yielding an FI of 0.25.” Intakes and risks will be recalculated to incorporate these changes.

Comment: “The adherence factor is extremely non-conservative.”

Discussion: As was discussed at the September 24, 1999 meeting, the adherence factor was developed using guidance and recommendations provided in Chapter 6 of EPA's Exposure Factors Handbook, August 1997.

- 1) **The types of exposed body parts were first determined.** This was done by examining the types of clothing worn by groundskeepers listed in Table 6-11, "Summary of Field Studies" of the Exposure Factors Handbook. Five groundskeeper descriptions are presented in Table 6-11, and Groundskeeper 5 was selected because they were active for 8 hours each day, and their clothing resulted in the most exposed surface area of all the grounds keepers. Exposed body parts for the groundskeeper wearing shorts, a short sleeve shirt, and work boots were determined to be the head, arms, hands, and legs.
- 2) **The surface area of the head, arms, hands, and legs were next determined using Table 6-4 of the Exposure Factors Handbook.** The surface areas used in this report are the weighted averages for each body part listed for men and women in Table 6-4. The total exposed surface area for the grounds keeper is 0.92 m² using this method.
- 3) Once the body parts and receptor activities were determined, **Table 6-12 of the Exposure Factors Handbook was used to determine the soil adherence factor of the exposed body parts.** These adherence factors range from 0.0009 to 0.032 mg/cm².
- 4) **The surface areas determined in Item 2, and the adherence factors determined in Item 3 were used to construct a weighted average adherence factor of 0.00703 mg/cm².**

Action: We will include a detailed explanation of the derivation of this number in the text of Section A.3.4.2.9.

Comment: "The carcinogenic averaging time should be 25,550 days (350 days per year for 70 years)."

Discussion: In the Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A), EPA defines AT as "Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365), and 70 year lifetime for carcinogenic effects (i.e., 70 years x 365 days/year)." The latest guidance from EPA, summarized in Table 1-2 of Exposure Factors Handbook, August 1997, recommends using a life expectancy of 75 years to reflect the latest census findings. This yields an AT for carcinogens of 75 years x 365 days/year or 27,375 days. This information is presented in footnote "g" of Table A.3-9.

Action: No modifications are proposed for inclusion in the revised BRA report.